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ZF Test Systems
Low Speed Uniformity Balancing Machine

The right is reserved to modify products and technical data.



The innovative
2 in 1 testing
solution

IT / LUB 2008 / E



Driveline and Chassis Technology

ZF innovation: Low Speed Uniformity Balancing Machine

There are many test systems on the market that measure either uniformity or dynamic unbalance. The innovation is to combine both in one machine. With the Low Speed Uniformity Balancing Machine (LUB) ZF Test Systems has realized this in an advantageous way. This machine enables users to measure all conventional STU values, and the values of static and dynamic unbalance, all in one cycle, in one test position – adding only three seconds to the cycle.



The LUB machine in the final tire control

To ensure the quality in the areas uniformity, unbalance and geometry the tires are passing through the measuring station. After that the tires are conveyed into the rear-mounted marking position on transport conveyors and will there be marked in correlation with the measured quality before being forwarded to the sorting station..

Advantages of a combined machine

One machine – many advantages

Combined measuring of uniformity, unbalance and geometry in one machine offers a variety of fundamental advantages:

Energy

The measuring in one position and one cycle saves half of your expensive compressed air.

Space

You save the complete space of a dynamic unbalance machine and its conveyor technique.

Maintenance

In comparison to a uniformity machine the LUB machine has no additional mechanical functions.

Tooling

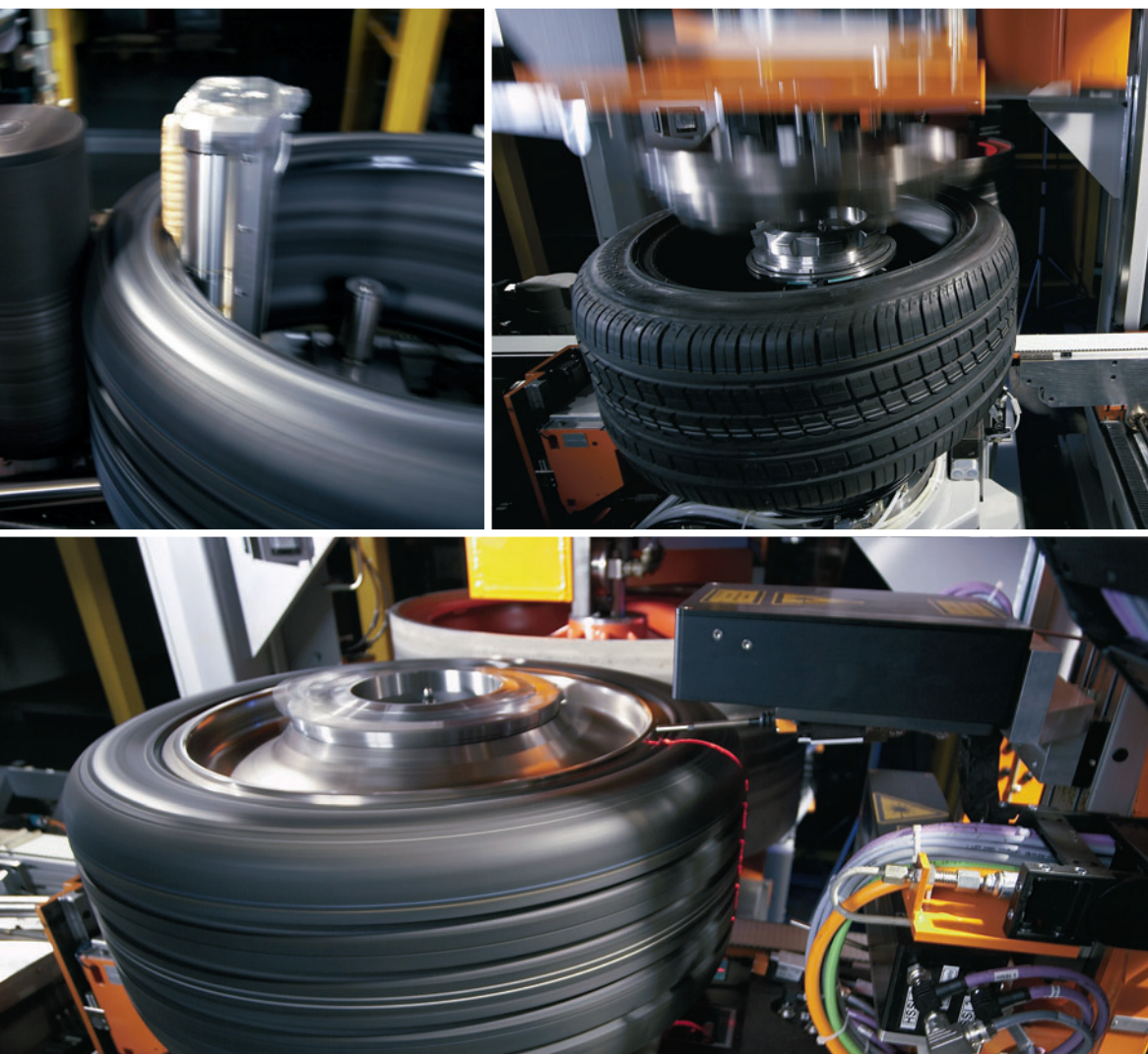
Half of the investment and half of the efforts for tooling changes (staff and logistics)

Quality

Correct relation between unbalance, uniformity and geometry due to date sourcing in one chucking

Invest

The two for one deal



Excellently combined

The bead must be diligently wet with soap by using a brush, to make sure that positive tire setting characteristics on the measuring rim can be achieved. Thanks to the intelligent combination of the individual measurements in the test cycle, cycle time could be optimized.

Measuring functions

Uniformity

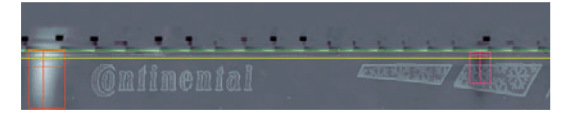
The values of the standard uniformity are collected in the well proven way with two component load cells at the ends of the load wheel axis.

Unbalance

The static and dynamic forces of the unbalance are measured by Piezo sensors on the wheel side.

Geometry

The geometric characteristic data of the tire are collected by means of a modern sheet of light imaging system. The machine has two lateral sensors for the upper and lower side wall as well as a separate radial sensor.



Geometry measuring unit

- Full topographic sidewall scan by sheet of light system
- Bulge detection on the whole sidewall also in design and letter areas
- Separate free adjustable tracks for the run out and bulge evaluation

Control technique

Everything is reliably controlled

The LUB machine is controlled, configured or maintained by a self-explanatory visualization and operating system. Settings are made by means of the integrated touch screen or remote controlled through the network. Modular generation and flexible configuration of test sequences are possible.

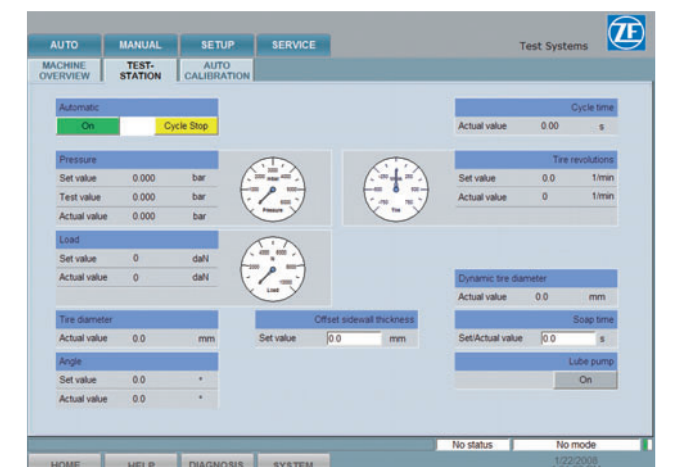
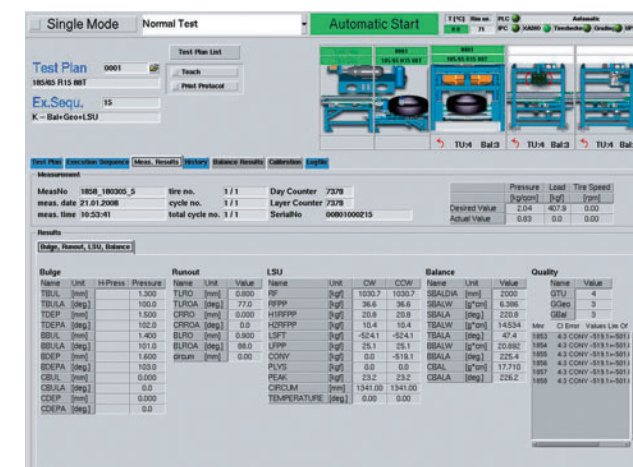
Thanks to the use of established and standardized components, a safe and reliable future can be achieved.

Automation-oriented

- Data exploring by browser via Intranet or Internet MySQL data base
- LINUX operating system
- flexible data exchange with customer network

Machine-oriented

- High performant SoftPLC in a realtime task programmed on a IEC61131-3 conform evaluation system
- State of the art control technology for load and air
- For main adjustments all servo axes work in a closed-loop controlled system
- Automated calibration process



Basic configuration and optional accessories

Space-saving and flexible

The compact design of the machine enables the installation with comparable space and infrastructure requirements as on a conventional Low Speed Uniformity Machine. The measuring station presents the heart of the machine, where uniformity, unbalance and geometry are investigated.

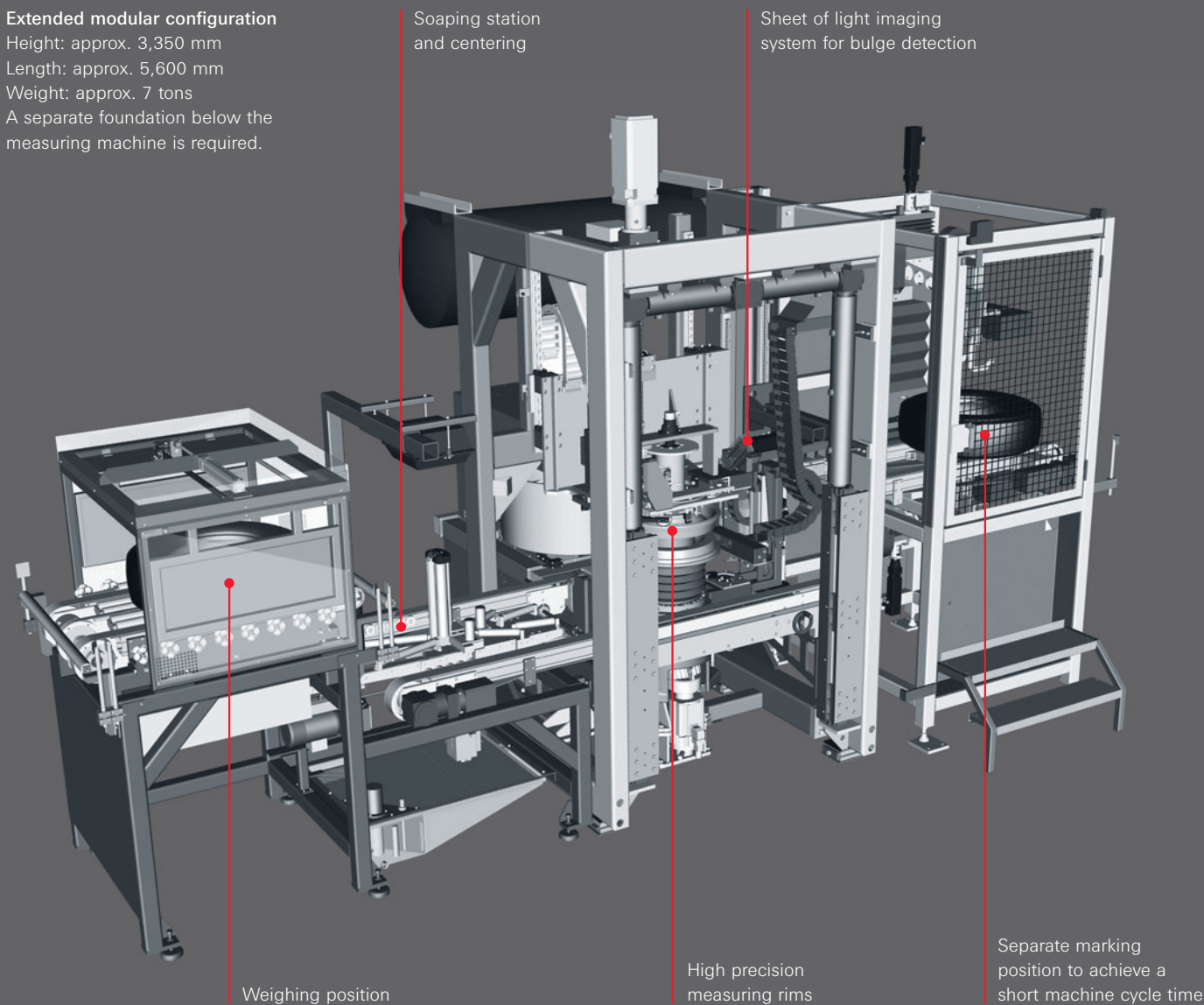
The complete design includes the modules for weighing, soaping and centering as well as marking. Due to the modular concept, adaptation to the specific needs of the customers is possible with only small efforts. This allows also easy integration into current production lines.

Additionally available are:

- Barcodescanner
- Data interface to host system
- Sorter
- Calibration kits for force, unbalance and geometry
- Rim changing tool

Extended modular configuration

Height: approx. 3,350 mm
Length: approx. 5,600 mm
Weight: approx. 7 tons
A separate foundation below the measuring machine is required.



Measuring and analysis values

Technical data

The conventional measured and analysis variables of the individual machines to measure uniformity, unbalance and geometry are fully available.

This is of course also understood for the quality of the measuring values.

Measuring and analysis values

Low Speed Uniformity

Radial force variation	RFV cw, ccw
Harmonics of radial force variation	H1 to H16 RFV
Lateral force variation	LFV cw, ccw
Harmonics of lateral force variation	H1 to H16 LFV
Conicity	Co
Plysteer	PI
Outer diameter	D cw
Deflection	De cw
Rolling Circumference	RC

Unbalance

Static	stat
Couple	cpl
Plane 1	m1
Plane 2	m2

Geometry

Radial run-out	RRO
Lateral run-out	LRO
Harmonics of radial run-out	H1 to H16 RRO
Harmonics of lateral run-out	H1 to H16 LRO
Bulges/Undulations	

Weighing Station

Mass	m
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Technical data LUB-P-4.1			
Tire dimension	Bead diameter	inch	13 to 25
	Outer diameter	mm	500 to 1020
	Section width max.	mm	440
	Weight max.	kg	55
Test load		kN	0.5 to 10.00*
Load wheel	Diameter	mm	854
	Width	mm	420
Measuring rim	Range of rim width adjustm.	inch	6
	Range of rim width	inch	2.5 to 14
Test pressure		bar	1.5 to 4.5
Setting pressure		bar	1.5 to 6
Measuring speed		rpm	60

*optional 20